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School Lunches for Needy Children



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Cover Page

This winter, lunches were served for the first time to children in a number of small, isolated rural schools in Eastern Kentucky, through the efforts of U.S. Department of Agriculture personnel working with State and local officials. These special school lunch programs are among the tools used by USDA's Agricultural Marketing Service to help in "the attack on poverty" mentioned by President Lyndon B. Johnson in his State-of-the-Union message. During the early months of 1964 the National School Lunch Program was extended to hundreds of schools and thousands of children in the Appalachian area of Eastern Kentucky. Similar programs are also underway in other States in every section of the country. Typical of cooperative efforts, this local mother (shown on the cover) voluntarily prepares and serves lunch in a Kentucky school.

Editor, MILTON HOFFMAN
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A New Moisture Meter for Hay

THE farmer who has been twisting, smelling, rattling, or even scratching his hay to determine its moisture content may soon have the help of a fast and accurate moisture meter to do the job for him.

The instrument is portable, can be used in the field with no special preparation, and provides a moisture content reading within 2 or 3 minutes. It was developed by Agricultural Marketing Service researchers of the U.S. Department of Agriculture, with the cooperation of the Texas Agricultural Experiment Station.

Knowing the moisture content of forage crops has always been important to farmers. Hay harvested with too much moisture tends to pack, causing heat and mold damage, while hay that is too dry tends to shatter its leaves and become brittle, discolored, and dusty.

Recent developments in harvesting, storage, and preservation of hay have increased the need for fast, accurate, simple, and versatile methods of determining moisture content.

Several instruments using different principles are now in use for moisture measurements, but none combines all the requirements to make it practical to use in the field.

Albert W. Hartsack, Jr., an agricultural engineer with the Agricultural Marketing Service, experimented with several different approaches and decided an instrument using the electrical conductance method to measure moisture content offered the most promise.

He designed and constructed a press and holder for the sample to be tested,

an electrode, and a simple electrical circuit. Objectives in design and construction were: portability and battery operation; safety from electrical shock; rugged construction; and a sensitive and reliable measuring circuit.

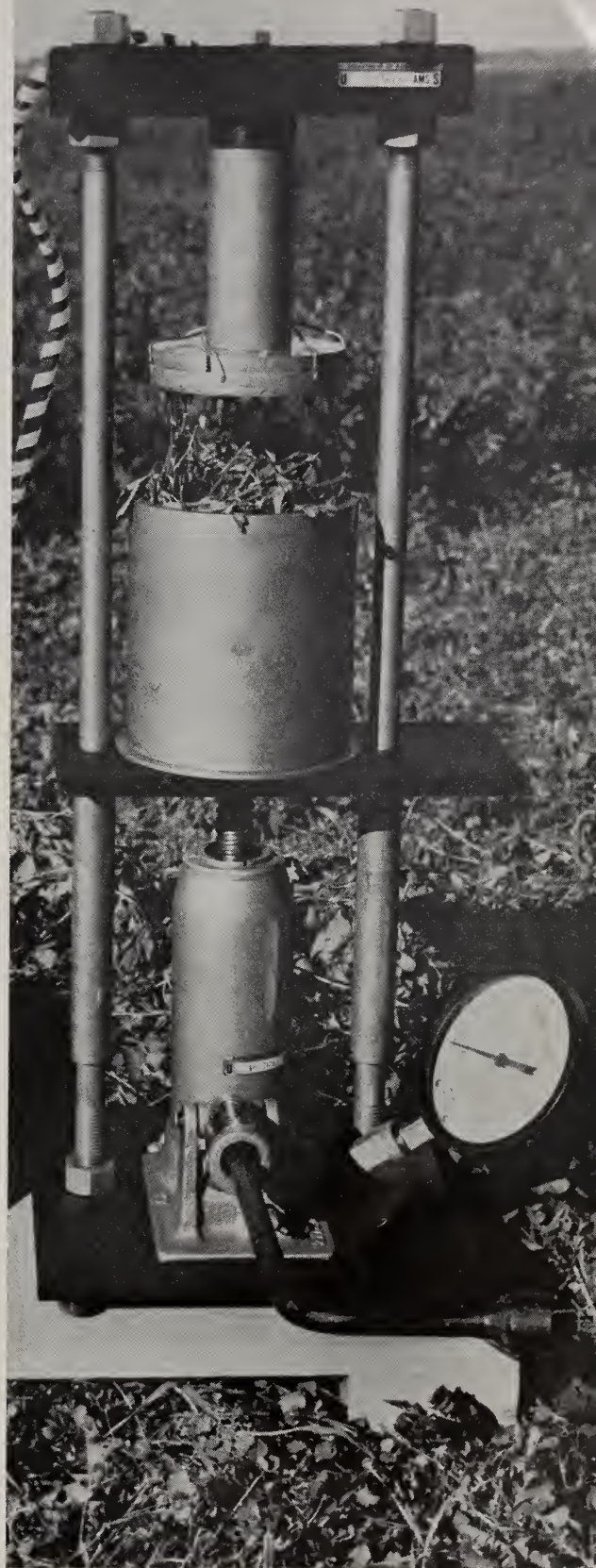
In the instrument developed, the hay sample to be tested (alfalfa in this case) is placed in a cylindrical holder, and the holder is placed under the compression electrode. A hydraulic jack then exerts a pressure of 600 pounds per square inch on the hay sample, a meter is adjusted, and the moisture content noted.

The instrument was measured for accuracy in tests using the widely recognized oven drying method as a control. The oven drying method, which dries known weights of hay and calculates moisture content from the weight loss of the hay, is accurate but slow, and cannot be used satisfactorily in the field.

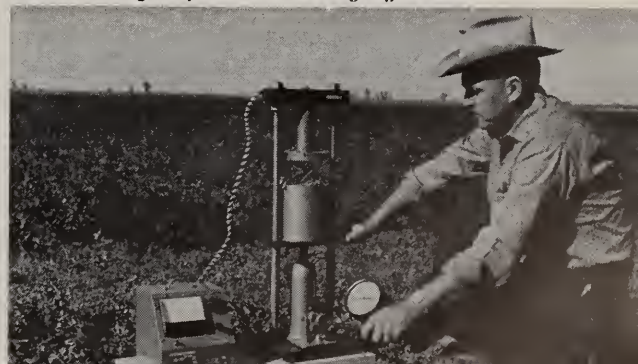
The readings from the moisture meter showed a high correlation to the calculations made in the oven drying tests. The meter measurements were found to be accurate enough to give it promise as an important tool during hay making, Hartsack reported.

The meter, in its present stage, cannot be used with hay containing moisture of more than 50 percent, because juices squeezed out by the high pressure cause erratic and meaningless readings.

Being tested now are changes and improvements in the meter which are expected to increase its efficiency and provide calibration guidelines for use with hay crops other than alfalfa.



Meter shown here, developed by AMS researchers, determines the moisture content of hay so fast and efficiently that it may replace oven drying tests.





In this peanut kernel are larvae of an Indian meal moth which AMS researchers came across in efforts to determine what species of insects affecting stored products may be developing resistance to pesticides.

Insect Resistance to Pesticides

Researchers Explore Ways to Reduce Insects' Growing Immunity to Chemical Controls

Insects which can infest and otherwise damage stored agricultural products show signs of developing resistance to pesticides similar to that previously noted in field insects.

Preliminary reports from U. S. Department of Agriculture marketing researchers have evidence that at least some species of stored-product insects no longer can be controlled with the same pesticides or amounts of application formerly found to be effective.

For example, Agricultural Marketing Service researchers found in one survey that insects taken from a warehouse where malathion had been used required $4\frac{1}{2}$ times the dosage used on a laboratory strain of insects to get the same control results. They have also encountered indications of resistance to pyrethrum in insects collected from warehouses in Florida. And they suspect the same may be true with insects involved in the storage of other commodities.

To obtain further information on this significant development, researchers in the Stored-Product Insects Branch of the Market Quality Research Division of AMS have started on a project to determine what species of insects affect-

ing stored-products may be developing resistance; the degree of resistance, and how widespread it may be.

All field station researchers have been asked to submit evidence and findings when they do not achieve the pesticide control they think they should be getting under given conditions. They have also been requested to send insects taken from storage buildings to the insect laboratory in Savannah, where they will be tested for resistance, or relative susceptibility to insecticides.

The nature and origins of insect resistance to pesticides are complex.

The term "resistance" is used to describe a condition in which a population of an insect species that was originally susceptible to an insecticide has lost that susceptibility so that it now resists control. There is a great deal of variety among individuals of a population in their susceptibility to an insecticide. Those with less susceptibility are said to have a tolerance for the insecticide.

Insects do not acquire this tolerance during their lifetimes, but have inherited it. Resistance appears only when a whole population is under constant and repeated attack with an insecticide

through successive generations. The majority of the insects are killed, and by selectivity the more tolerant ones survive.

The next generation inherits this tolerance and by a reshuffling of hereditary factors eventually may acquire greater tolerance. The resistance of the total population thereby tends to become greater with each new generation and eventually may lead to complete immunity to a particular insecticide.

Entomologists have been aware for many years of the ability of insects to become resistant to insecticides. Resistance became of world concern, however, about 15 years ago when it was discovered that DDT and some of the other new insecticides were becoming less effective against such common insects as flies, mosquitoes, and roaches, and some of the insects attacking crops in the field. But it was believed at the time that the same problem would not arise as rapidly with insects that attack stored products. Among the reasons for this belief is the longer life cycle of some stored-product insects, which would tend to diminish rapid breeding of resistant strains, and the fact that stored-product insect infestations tend

to be more confined than those of field-crop insects, and so would not be able to spread a resistant strain as readily over wide areas.

"We thought we were safe," one stored-product entomologist said, "but now we find we aren't—we have the same problem."

This "same problem" began to show up about 10 years ago in peanut storage. In the early 1950's, pyrethrum was found to be an effective insecticide for insects in stored peanuts. By the mid-1950's, the industry was no longer satisfied with the protection provided by pyrethrum.

But by that time, a malathion treatment was being developed. Tests proved so successful it was adopted immediately by the industry. For the first few years, storage operators said that malathion was giving them almost complete protection for the first time.

However, late in 1962 researchers began hearing complaints that insects were beginning to show up in bulk storage of farmers stock peanuts in spite of the malathion applications. The AMS researchers collected insects from warehouses reporting unexpected infestations, and the susceptibility of these insects was tested against laboratory strains which had not been exposed to malathion.

The insects which had been exposed to the insecticide in the warehouse required $4\frac{1}{2}$ times the dosage the unexposed insects did to achieve the same results.

The development of resistance by stored-product insects is especially important. Only very few insecticides are approved for use where stored products are involved because these prod-

ucts are often already processed and closer to the consumer in time and form, and there is usually not much time for the effects of the insecticide to dissipate. With insecticides used on crops in the field, there is more time for the chemical to weather and break down before the commodity reaches the consumer, and later processing and cleaning often helps diminish the pesticide residues.

Related to this is the fact that substitute insecticides are difficult to find because of the high safety factors required for those to be used against stored-product insects. Furthermore, three years or more may be necessary to obtain the research data required for the approval and establishment of a tolerance for a promising new insecticide.

In spite of the difficulties, AMS researchers are continuing projects aimed at finding new promising insecticides to be used on stored products in place of those to which insect resistance has been detected.

But they are also working on non-chemical means of insect control to achieve protection of stored products without the use of pesticides.

With stored peanuts, such non-chemical means include controlled atmosphere storage and cold storage, both being studied by USDA researchers. By controlling the atmosphere in which the peanuts are stored, such as reducing the amount of oxygen, the scientists can bring about conditions not conducive to insect breeding. Work on this is progressing, but is yet to be checked for the effect it might have on the product.

Cold storage is now used commercially, in a limited way, on only higher-

priced shelled peanuts because the method is too expensive for bulk storage of farmers stock peanuts, those still in the shells. The lower temperatures inactivate the insects or kill them outright.

Other non-chemical approaches that should be investigated for use with commodities other than peanuts, AMS entomologists say, include various kinds of radiant energy treatment and biological control of the insects.

These non-chemical methods are not faced with three disadvantages of chemical pesticides—time required for approval, safety, and the possibility that insects may in time become resistant to the new chemical. But they have disadvantages nonetheless.

A non-chemical method of insect control may not need the time required for safety clearances, but it may involve serious changes in the handling of products. It may even be more complicated and time consuming than chemical methods in the long run, and prove to be more expensive, as in the case of new warehouse facilities needed for cold storage of peanuts.

The resistance problem is very complex, further complicated by the fact that each insect poses its own special problems, and what works with one insect may not work with another.

But AMS researchers are continuing projects aimed at developing effective insect controls which will protect stored products from infestations and hold down the cost of storing, processing, and marketing agricultural products.

When pesticides are used in practice, proper precautions should be observed to protect people, farm animals, and wildlife as noted on the label.

Indian meal moth cocoons are responsible for the damage to the burlap of this peanut bag. Such insects have lost their susceptibility to pesticides and are resisting

control. As they pass this tolerance on to succeeding generations, it becomes greater and greater and may lead to complete immunity to a particular insecticide.



Hot Water Reduces Decay in Fresh Produce

PLAIN hot water appears to be one of the more promising approaches to the control of fruit and vegetable spoilage in marketing channels. Inexpensive, easy-to-use hot water treatments may be more effective — and more economical — than the methods now used to reduce decay in fresh fruits and vegetables after harvest. Wide application of the heat treatment principle for quality retention in fresh fruits and vegetables began recently. During the past three years, marketing researchers in the Agricultural Marketing Service of the U. S. Department of Agriculture have tested hot water and heated, high-humidity air as treatments for many kinds and varieties of fresh produce.

Peaches, mangoes, lemons, oranges, cranberries, red raspberries, blueberries, bell peppers, cantaloups, and sweet potatoes have been treated in hot water dips for determination of product tolerance to the treatment and evaluation of decay control.

Treatment for short periods in water heated to a predetermined temperature did not affect the flavor, texture, or ripening time for these products. The optimum temperature and duration of the treatment varied with different products. Further tests may lead to additional time-temperature combinations for different varieties of the same product.

Oranges and blueberries were the only products tested that were consistently injured by the heat treatment. Occasionally, some rind injury occurred on lemons and grapefruit, and surface mottling was found on some varieties of peaches.

One of the first tests with hot water treatments by AMS marketing researchers was applied to peaches at the Horticultural Crops laboratory in Beltsville, Maryland (see *Agricultural Marketing*,

February 1962). Additional AMS tests were made with peaches under semi-commercial conditions last summer. A pilot model treating facility was used in the southeastern peach area.

Later, a commercial facility was built and some 40 full trucklot shipments were successfully treated in the commercial operation. Treatment in water at 130° F. for 2 to 3 minutes cut decay to a small fraction of the amount present in untreated peaches.

Researchers tested the treatment by inoculating fruit samples in some tests with decay-producing organisms typically present on produce in market channels. The hot water treatment was then applied to a portion of the samples. Peaches that were not treated developed decay to such an extent that they would not have been marketable. Only a small portion of the treated samples developed decay.

The hot water treatment leaves no residue on the product, presents no problems in mixing solutions or maintaining a correct concentration of the solution, and can be easily used at reasonable cost. Under commercial conditions, the treatment would be applied to peaches before the produce is sorted, packed, and precooled. It could also be used by the homemaker or gardener by simply holding the commodity for a predetermined period in a large pan of water heated to the desired temperature.

Tests with green peppers were made at the AMS field laboratory in Harlingen, Texas. The peppers were inoculated with organisms causing bacterial soft rot. They were then held under conditions simulating commercial temperature and humidity levels for a period representing a normal time lag between harvest and packing. Under these conditions, decay organisms that might be present at time of harvest or

in storage facilities had ample opportunity to become well established on the peppers. However, the hot water treatment provided very good control of soft rot and did not injure the peppers. The researchers obtained best results when the peppers were held for 1½ minutes in water heated to 128° F.

Spoilage was reduced about 50 percent when cranberries were treated with water heated to 110°, 115°, 120°, and 125° F. at the Beltsville laboratory. The berries were then stored two to six months at 38° F., to simulate commercial storage practices. Several temperature-time combinations were tested with cranberries, but the treatment at 125° for 2½ minutes was most effective.

One of the shortest effective treatments was obtained with red raspberries. Researchers at Beltsville reduced decay considerably by holding the berries 1 to 2 minutes in water heated to 125° F. The treated berries of some varieties remained in good condition for longer periods than the untreated berries, but other raspberry varieties did not respond favorably.

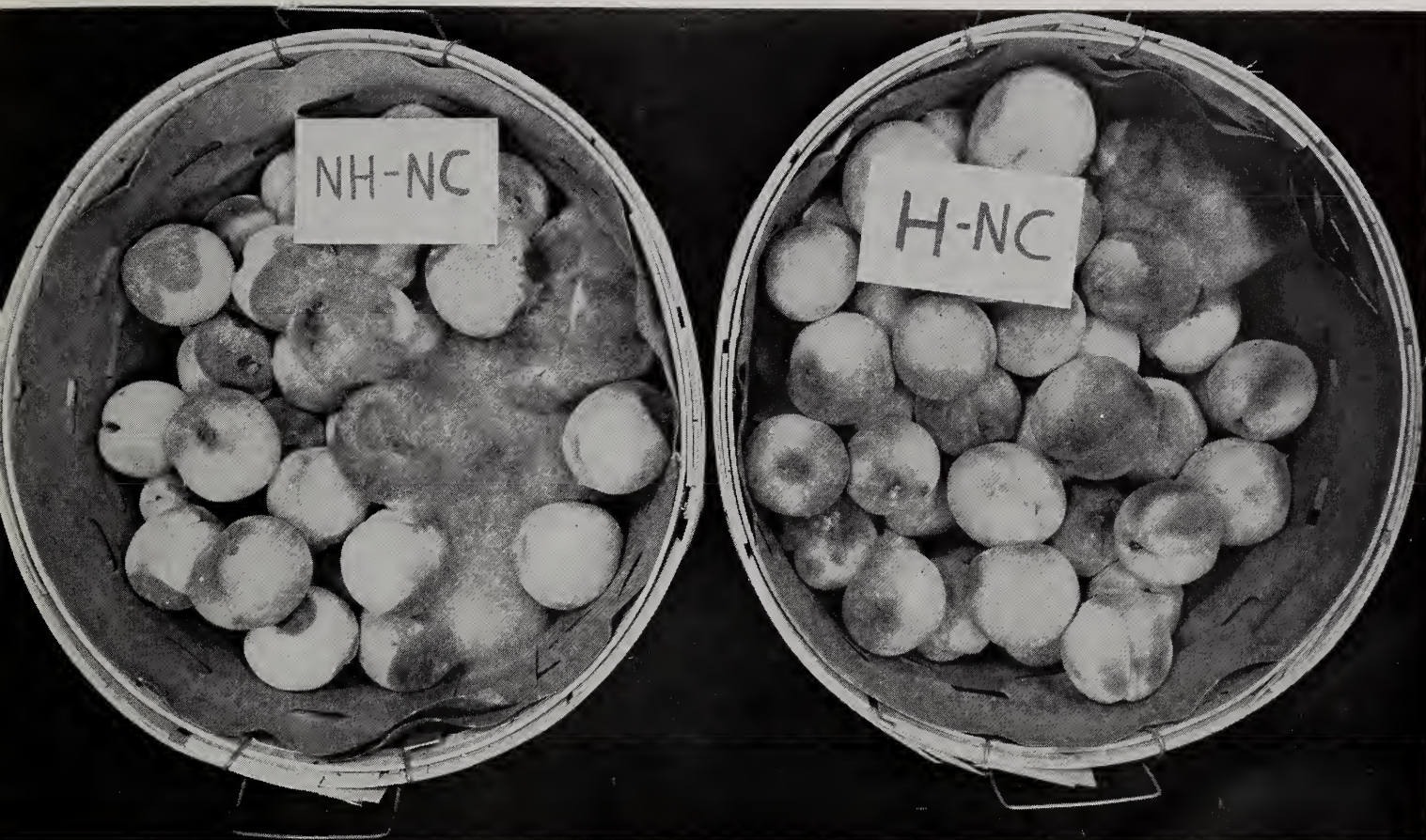
Florida-grown mangoes received excellent protection from anthracnose, a fungus disease common to this fruit, when held 5 minutes in water heated to 132° F. Tests made at the Miami and Orlando, Florida, AMS stations show that none of the untreated samples would have been marketable.

Although the tests were conducted in the laboratory, commercial conditions were simulated. The normal rate of softening and the ripened flavor of the mangoes were not affected by the treatment.

Different temperature-timing combinations may be desirable for various varieties of mangoes. The University of Puerto Rico has conducted tests in which successful control of anthracnose was obtained with the Larravri variety by immersion in hot water for 15 minutes at about 125° F.

Anthraxnose decay of papayas has also been reduced during marketing by heat treatments developed by the Hawaii Experiment Station. A hot water treatment was also developed for control of brown rot in lemons many years ago at the University of California. And the Australians have had some success with heated air treatment for decay control in cannery peaches during ripening, before processing.

Additional hot water treatments will be tested by AMS marketing researchers this year on various varieties of the same products that were tested last year, and on additional commodities.



Neither of these baskets above was precooled before shipment but peaches at right were given a hot water bath and remained in better condition than untreated ones at left. Note typical signs of decay and mold in both baskets.

Baskets below were precooled before shipment. Best ones, at right, were given hot water bath while those at left were unbathed and decayed more. Peaches were photographed at market after four days of storage at 70° F.





Above, Louisville's old produce terminal with no loading dock. Note its nearness to downtown traffic congestion. At right, the new terminal with two multiple-occupancy buildings and railroad spurs in background. Next page, the interior of the refrigerated unit with pallet racks and fork lift equipment.

The Louisville Produce Terminal

First Successful Combination of Several Cost-Reducing Innovations

By F. R. Todd, Jr.

THE first successful combination of drive-in pallet racks, a completely refrigerated interior, and air doors in a multiple-occupancy warehouse for food products will be available for inspection by produce market managers when they meet in Louisville, Ky., in April.

The system was installed in nine units of the Louisville produce terminal in 1960, five years after the market was opened. Since then, the combination has been installed in several other terminals.

Members of the National Association of Produce Market Managers will tour the terminal during their annual meeting beginning April 12.

Marketing researchers in the Agricultural Marketing Service of the U.S. Department of Agriculture helped design the refrigeration system which made the combination possible. They had earlier, at the request of city and industry representatives, helped select the site and design plans and layouts for the terminal.

The drive-in pallet racks had been

used by industry in warehouses before, but use for fresh produce is limited. With pallets stacked three high, greater utilization of the 18-foot-high storage rooms was possible. And the specially designed refrigeration system made it possible to maintain the quality of the fresh fruits and vegetables throughout the entire cubic footage of the storage units.

An air door, a forced air flow that acts as a curtain across the door opening to reduce refrigeration losses, permits rapid and safe access between the loading platform and the storage rooms.

Two firms, a service wholesaler and a refrigerated storage firm, adopted the refrigeration rack system in their combined space of 9 units. Temperatures are maintained at about 55 degrees in most areas, with smaller rooms held at lower temperatures as required by the items stored.

The pallet racks and forklift trucks enable the firms to handle larger quantities of produce more efficiently, and make possible the selection of more items with less distance to travel. Be-

fore the system was installed, the produce was stored on one level of pallets on the floor or stacked directly on the floor.

The refrigerated storage facilities also efficiently serve the requirements of other wholesalers in the terminal, who often find need for storage beyond a normal weekly turnover. One example is the storage of apples, which are held for gradual sales during the fall months.

Other changes in operations at the terminal have been made to increase efficiency. Many firms are now using pallets and skids for stacking and moving produce, in place of the less efficient two-wheel handtrucks and stacking on the floor.

The Louisville terminal was built in 1955 to replace antiquated and inefficient facilities, which were in a congested downtown area. A new location was selected close to a railroad line and limited access highways near the city limits.

Originally, the new market consisted of two multiple-occupancy buildings for wholesalers with 25 units in each structure, a farmers' market, and team-track



area. The wholesale buildings have main floors and platforms at railroad car and truck floor level, house tracks beside the rear platform of both buildings, and a ceiling height sufficient to allow mezzanine offices.

The Louisville Produce Terminal was organized as a private corporation, and is owned primarily by the wholesalers operating there. The total investment in land and buildings was approximately \$1,100,000 of which about \$190,000 was stockholders' equity. Since the market has been in operation, the liabilities have been reduced approximately 30 percent. The board of directors eliminated early operating deficits by increasing the occupancy rate and selling land to other firms. Each year the cost of operating the market has been approximately \$110,000 of which nearly two-thirds is for debt service and the remaining third is for salaries, maintenance, taxes, and utilities.

Additions to the market include facilities for a major terminal prepacker of fruits and vegetables who built an individual building of about 31,000 square feet on land which had been provided for expansion. A loading and unloading facility for railroad piggyback operations has been established beside the market team track. Although foods represent only an estimated five percent of the present piggyback volume, the close proximity of such a facility to food wholesalers and brokers permits easier handling of such arrivals. These additions were financed by the users. Other additions on the site

financed by the market corporation include a truck service station and partial enclosure of the farmers market for retail trade.

Several factors have attracted additional food firms and other distributive industries to the vicinity of the new market. (1) The market is advantageously located within a mile of the belt highway which provides rapid access to all parts of the area. (2) A major railroad adjoins the property. (3) Land is relatively low-priced and ample land is available for future development. The types of firms that have selected the market area include a baking company, a beverage distributor, a milk cooperative, dairies, farm supply firms, a rural electrification service depot, an appliance distribution warehouse, and a bank.

While other distributive businesses have located around the market, there has been no requirement for additional multiple-occupancy buildings for fresh fruits and vegetables, because the volume of these fresh products has remained at about 160,000 tons per year since the modern facilities were opened. There has been a 20-year national trend toward slightly less per capita consumption of fresh fruits and vegetables, but the lower consumption per capita has been offset by a 21 percent population increase in ten years within the metropolitan area. The 20 existing firms have increased their annual tonnage although five firms have ceased operations or merged with other firms since the market opened.

Progressive changes applicable to better distribution and processing operations in and around the market are encouraged by good market managers. Their broad experience enables them to recognize situations involving sales promotion and business management methods that are important to their tenants. The success of the Louisville manager, Edward F. Seiller, was exemplified by his being selected by the National Association of Produce Market Managers as Market Manager of the Year in 1963. His broad background as a local attorney and former deputy governor of the Farm Credit Administration of the U.S. Department of Agriculture has proved to be valuable to the Louisville area. Even though the knowledge of law, finance, and marketing practices are not within the direct experience of all market managers, the ability to use these tools is essential.

In about 30 other cities in the United States new wholesale produce markets or wholesale food distribution centers have been established. Most of these facilities are experiencing continued growth of complementary food processing and distribution operations because good sites have been selected with respect to distribution potential. Innovations like those developed in Louisville increase the economic advantage of a good location because efficiencies in internal handling help to reduce the total marketing cost.

(The author is a Marketing Specialist in the Transportation and Facilities Research Division, AMS.)

Changes in Wheat Standards

Secretary of Agriculture Orville L. Freeman said recently the U.S. Department of Agriculture will modernize official United States standards for grades of wheat as an important step to increase dollar sales of U.S. wheat in overseas markets.

The new standards become effective June 1, Secretary Freeman said. He said the new standards will:

- Improve the competitive position of U.S. wheat in world markets—where competition will intensify in the future.

- Help combat increasingly restrictive trade policies in some areas, particularly the Common Market.

- Enable the Commodity Credit Corporation to better guarantee the quality of grain owned by the public.

- Provide substantial taxpayer savings in the export subsidy program.

- Strengthen the price of wheat for the farmer who grows quality wheat.

In general, the new standards—based on narrower ranges of tolerance for each grade—will mean less foreign matter and dockage in American wheat than in the past. Quality factors of weight, soundness and cleanliness can be more readily and more precisely measured today than in the past. Current standards have too great a tolerance within grades to provide a reliable basis for judging soundness or cleanliness.

The following principal changes are being made:

Maximum limits are set for “total defects” in each numerical grade. (“Defects” are damaged kernels, foreign material that cannot be removed readily by cleaning, and shrunken and broken

kernels.) The existing standards contain no limits on the total of these defects other than the total of the maximum limits for each of these three factors. The change establishes a limit for total defects in U.S. No. 1 grade at 3 percent, in No. 2 grade at 5 percent and corresponding limits in the other grades.

Limits “for shrunken and broken kernels” are lowered from 5 to 3 percent for grade No. 1. Limits for grades Nos. 2 and 3 remain at 5 and 8 percent. Maximum limits for shrunken and broken kernels are set for the first time at 12 percent for grade No. 4 and 20 percent for grade No. 5.

Minimum moisture content for wheat graded as “tough” is reduced from 14 or 14.5 percent (depending on the class) to 13.5 percent for all classes. The change also eliminates moisture as a factor in determining “sample grade.”

“Dockage” is recorded in intervals of one-half percent—that is, at one-half, one, one-and-one-half percent, and so on. Fractions other than one-half are reduced to the next lower half or whole percent. (Dockage is material other than wheat, which can be removed readily by cleaning. It is not considered as a factor in determining grade, but it is recorded on inspection certificates.) Under existing standards, dockage—when amounting to one percent or more—is recorded at the next-lower whole percent; fractions are reduced to the nearest whole percent.

A statement is to be made on the inspection certificate showing the percentages of White Club Wheat and Common White Wheat in the subclass Western White Wheat. But no change

is made in the present subclass name, “Western White Wheat.”

A special grade of “Heavy Wheat” is provided in grades No. 1, 2, and 3 to recognize superior test weights as an indicator of quality.

The maximum limit for “wheat of other classes” for grade No. 1 is reduced from 5 to 3 percent. More restrictive limits are provided in all grades for “contrasting classes”—those that can be readily distinguished from others. But Soft Red Winter Wheat in the class White Wheat, and White Wheat in the class Soft Red Winter Wheat are exempted as “contrasting classes,” since it has been shown that end uses of the two classes are similar.

Some other changes of less general interest and importance are also made.

A transitional period will be provided, following the June 1 effective date. During that time, grain inspectors will—on request—show the grade of a lot of wheat under the old as well as the new standards.

Secretary Freeman noted that the changes in grade standards were made only after conferences with wheat industry representatives, a study of competitive conditions in world markets by a joint Government-industry team, and four public hearings around the country.

“I wish particularly to thank all those persons who presented testimony either at the hearings or in writing,” the Secretary said. “Because of the interest in the grade revisions, I am sure that the new standards will more accurately reflect the needs of this country as it moves more aggressively into world markets.”

“No decision I have made as Secre-

tary has absorbed more time, nor is there one to which I have given more thought. The evidence is impressive that present U.S. grade standards are no longer adequate in view of the competitive situation in world markets, or in view of advances in the technology of handling wheat.

"Present wheat grades permit excessive amounts of nonmillable materials, a situation hardly designed to encourage the sale of U.S. wheat. Between 1951 and 1961, the U.S. share of the world dollar market for wheat declined from 35 percent to less than 19 percent. U.S. dollar exports of wheat remained constant, but the total volume of trade increased.

"A study during 1959 to 1961 of European wheat imports shows that the total foreign material and shrunken and broken kernels in U.S. wheat was more than double that of wheat from Canada, Russia, Argentina or Australia. Last year, the study team of government and trade experts found that U.S. wheat was at a competitive disadvantage in European markets.

"If the United States is to export wheat—and wheat is historically an important earner of foreign exchange—then we must make up our minds that our wheat must be at least of comparable quality to that of other exporters. The new wheat grades are a step in this direction."

History—The standards by which the quality of wheat is measured are established by the U.S. Department of Agriculture, under authority of the 1916 United States Grain Standards Act, a measure to facilitate the marketing of grain in domestic and foreign commerce. The Act provides for establishment of standards for quality and condition of grain, and requires the inspection of grain that is sold by grade or offered for sale by grade and shipped in interstate or foreign commerce.

The original standards for wheat were established in 1917, and the last previous revision of them was made June 15, 1957. Over the years, better equipment and better methods have come into use in producing, harvesting, transporting, storing, cleaning, and drying grain. As a result, the cleanliness of U.S. wheat delivered at country points and received at terminal markets has improved substantially.

But complaints that the standards have failed to keep pace with the improvements in marketing practices have been increasing. They are expressed either openly, or more subtly, in fail-

ure to use the standards, or refusal to buy U.S. wheat.

Repeated suggestions in recent years of the need for improvement in grade standards led, about two years ago, to the beginning of a series of conferences by representatives of USDA's Agricultural Marketing Service with wheat producer, trade, and processor groups and organizations. In turn, the conferences led to the drafting by USDA of a series of proposals for improvement of the standards.

These were published in the "Federal Register" on August 3, 1963. A public hearing was announced and held on the proposals at Kansas City, Mo., on October 1; Minneapolis, Minn., on October 4; Portland, Ore., on October 8; and Toledo, Ohio, on October 11. Persons who could not attend to present their points of view were invited to submit written data, views and arguments to the Agricultural Marketing Service, by October 31, 1963.

These conferences, hearings, and comments produced a thorough discussion of the wheat standards, their present shortcomings, and the need for changes to more accurately describe wheat inspected under terms of the official standards.

Standards For Quality In Wheat—The discussion showed general agreement on the basic factors of quality in wheat—the weight, soundness, and cleanliness of the grain. These factors can be readily measured, in the rapid operation necessary in sampling and grading wheat as it moves in interstate or foreign commerce.

No change was suggested in the test weights per bushel.

But need was expressed widely for improvements in how the quality factors of soundness and cleanliness are

grouped into the numerical grades under the standards. Reductions were called for in the amount of nonmillable material, and in the wide variations in the amount of nonmillable material within a grade, to improve the grade designations as yardsticks of value and usability of wheat.

Broad Tolerances—Much of the testimony indicated that tolerances in the existing standards are too broad, and that the variances within grades have hurt producers of good wheat. The existing standards have been so loose as to fail to provide a reliable basis for judging soundness or cleanliness. When buyers buy solely on the basis of the U.S. grades, they have come to make a precautionary price discount—because of the possible wide variation in nonmillable material.

The buyer protects himself against receiving wheat at the bottom of the grade, by discounting the price he'll pay.

At the hearings, a representative of the milling industry stated the fact this way:

"... the ill effects of these wide open permissible limits are the fears that they may engender in the mind of the prospective buyer of wheat by contract."

Most shipments of wheat contain only a fraction of the allowable maximum of nonmillable material. Domestic buyers, who can buy on sample, adjust by looking at the wheat. But buyers who buy solely by grade protect themselves by discounting the price they pay for all wheat.

Effect On Foreign Markets — These broad tolerances damage the competitive position of U.S. wheat in foreign markets. The Wheat Market Development Evaluation Team (composed of

	MAXIMUM DEFECTS PERMITTED (%)									
	No. 1		No. 2		No. 3		No. 4		No. 5	
	Old	New	Old	New	Old	New	Old	New	Old	New
Damaged kernels.....	2.0	2.0	4	4	7	7	10	10	15	15
Foreign material.....	0.5	0.5	1	1	2	2	3	3	5	5
Shrunken and broken kernels.....	5.0	3.0	5	5	8	8	*	12	*	20
Total defects permitted (%).....	7.5	3.0	10	5	17	8	*	12	*	20

* No limits

This table shows maximum limits of "defects" permitted in each grade of wheat under existing (old) and under revised standards to become effective June 1 (new). "Total defects" consists of damaged kernels, foreign material, and shrunken and broken kernels. While limits are set for "total defects," some limits are also changed or set for the individual defects. Any wheat that exceeds the limits shown in the table for grade No. 5 is graded "Sample grade."



Grain inspector examines a "working" sample of wheat for damaged kernels and foreign material, which are a part of "total defects." Revised standards set a maximum limit in each grade for total defects.

industry and government representatives) made this report on its survey last summer of European markets:

"Whenever the team met with representatives of the wheat trade—it heard complaints regarding the quality and cleanliness of U. S. wheat. It was asserted that price differentials were inadequate to offset these disadvantages—that prices were, therefore, not competitive."

In the hearings, the view was expressed that the foreign buyer can obtain any quality of wheat he wants from the U. S.—if he is willing to pay the price—by writing a set of specifications or examining a representative sample of wheat. Offsetting views were offered that many buyers won't go to this extra trouble when they can buy wheat from other countries offering the greater uniformity of quality and con-

taining less nonmillable material without extra effort.

Records show that a much larger proportion of cargoes of U. S. wheat shipped to foreign buyers contained over one-half percent dockage, than did either receipts of wheat at domestic markets, or samples of farm-stored wheat.

Many wheat importing countries now restrict the quality of wheat that can be imported. An excess of nonmillable material is especially undesirable since foreign buyers don't want to use up their limited import quotas only to find they're getting nonmillable material instead of the wheat they wanted. Beyond this, they are reluctant to pay transportation costs on material that is of little value.

And European trade teams—visiting this country to examine our system of

producing and marketing wheat—ask the same question:

"Why can't we get the kind of wheat we have seen here on farms and in country elevators?"

Effects On Taxpayers — There are strong reasons to believe that this revision of wheat standards will save American taxpayers many millions of dollars a year, and will benefit wheat growers at the same time.

Much U. S. wheat contains only a small amount of nonmillable material as it leaves the farms and country elevators and would therefore grade very high under the new standards as well as the old if kept somewhere near its original quality.

The Commodity Credit Corporation makes use of inspection under the wheat standards when it puts grain into com-

mercial storage, or takes it back out of commercial storage. It requires return of wheat of the same grade, but not the same identical wheat that it put into storage.

To take an extreme example, this meant that under the old standards the CCC might put a bushel (60 pounds) of No. 1 wheat that had no defects and no dockage into storage, and get back No. 1 wheat containing up to 4.5 pounds of defective grain plus 0.54 pound of dockage. But using the new standards for No. 1 wheat, it could get back no more than 1.8 pounds of defective grain plus 0.24 pound of dockage. So the reduction in limits for defects plus the reduction in the quantity of dockage that can be present without being shown on the inspection certificate add up to 3 pounds per bushel or 5 percent of the total weight, in the case of No. 1 wheat. The effects would be comparable on other grades, above sample.

Therefore, use of the new grades instead of the old will have the effect of lessening the loss of quality and therefore of value of wheat owned by the Government.

The CCC is now paying subsidies on most of the wheat exported. It pays the same rate of subsidy on all grades, provided the wheat is fit for human consumption. To the extent that the tightening of standards results in keeping defective grain and dockage at home, taxpayers will be relieved of paying subsidies for exporting it.

To the extent that U.S. wheat becomes more competitive with wheat from other countries, in foreign markets, it is reasonable to expect that the quantity of wheat in government storage—and storage costs to taxpayers—will be reduced.

Effect On The Grower—Growers and country elevators don't use the wide tolerance currently in the standards. And most wheat delivered from the farm is of high enough quality so that, of the whole crop, the proportions falling into the various grades will be substantially the same as before.

What about price? The history of grain marketing has been that an improvement in grade standards results in better prices to the producer. In 1957, for example, wheat standards were tightened by raising the lower limits of foreign material, shrunken and broken kernels, and wheat of other classes, thereby reducing the range of quality permitted within the grades. The result was an increase in price, under the new

standards—even for the same numerical grades.

A grain economist, considering this point at the hearings, said:

"Tightening of our wheat grade standards, within a competitive marketing system, would insure the final delivery of wheat, wherever destined, much closer to the quality that now leaves our farms, and the farmer will in turn benefit from greater price competition in the country for top quality grades."

The improvements can therefore be expected to improve the farmer's income, by enhancing his sales position in export markets and by giving him greater prospects of selling his wheat into the markets of the world—markets in which he's been having sales problems, in part because of buyers' opposition to the excessive tolerances

provided in U.S. wheat standards.

Modifications—Testimony was presented at the hearings that some of the changes originally proposed were either unnecessary or undesirable. As a result, the changes adopted have been modified in a number of respects—regarding Western white wheat, expression of dockage, and certain "contrasting classes" of wheat—from the revisions originally proposed.

Time Schedule—The new standards will go into effect June 1, 1964—allowing the 90 days notice that is required after publication in the "Federal Register."

Copies of the amended standards may be obtained from the Director, Grain Division, Agricultural Marketing Service, U.S. Department of Agriculture, Washington, D.C. 20250.

Dockage tester is used to determine amount of dockage (or material that can be readily removed by cleaning) in a sample. Under revised standards, amount of dockage in wheat is recorded more precisely on inspection certificates.



Fungicides Improve Cottonseed Germination

By Alice M. Andersen

Where there's life there's hope—especially in the minds of homeowners and farmers who have high expectations for the seed they buy for a new lawn or a new cotton crop. But the life in the seeds may not always be indicated in germination tests made by seed analysts, as reflected on the label of a seed package. This is particularly true of cottonseed. Why? One of the likeliest reasons is because cottonseed used in today's germination tests may not have been protected before testing by the use of a fungicide.

Marketing researchers in USDA's Agricultural Marketing Service have recommended use of fungicides in all germination tests of cottonseed as a result of recent studies. In cases where a fungicide was used on heavily infected seed, germination scores increased an average of 20 percent, with some increases as high as 40 percent, with the Acala variety. Smaller, but significant, improvements were obtained with the Pima variety, with an average increase of 7 percent in germination, and some increases as high as 15 percent.

Acala cottonseed is fuzzier than the Pima variety, which may account for the difference in results with the fungicide on the two varieties. The fibers caused the seeds of the Acala variety to cling together and also to collect more fungi, indicating a greater need for the fungicide in germination tests with this variety.

The fungicide used in the AMS tests was a widely available commercial

product, and was applied as a dust. The treatment has also been used as a wet solution or slurry, by others, in large-scale tests.

Another change in present seed testing procedures recommended as a result of the AMS study was a 2-day longer test. A preliminary count of cotton seedlings would be made 6 days, instead of 4 days, after the seedlings were placed in incubation. The effect of some slow-acting molds could be more accurately determined in this added time. In some cases the mold is not evident when the seeds are counted in the 4 days allotted for germination of cottonseed.

Because fungicides are now generally used on cottonseed at planting time by farmers, the increased germination gained by use of fungicides in seed tests could be expected to represent more nearly the performance a farmer would obtain with his seeds after treatment.

Dual germination tests with, and without, a fungicide would indicate the improvement in germination that could be expected by a farmer who uses an appropriate fungicide.

Several factors that affected the performance of the fungicide tests were included in the AMS tests. Seed was used from crops grown in different years. Seed from the second crop showed less mold than seed from the first crop, but good results were obtained in both groups of seeds.

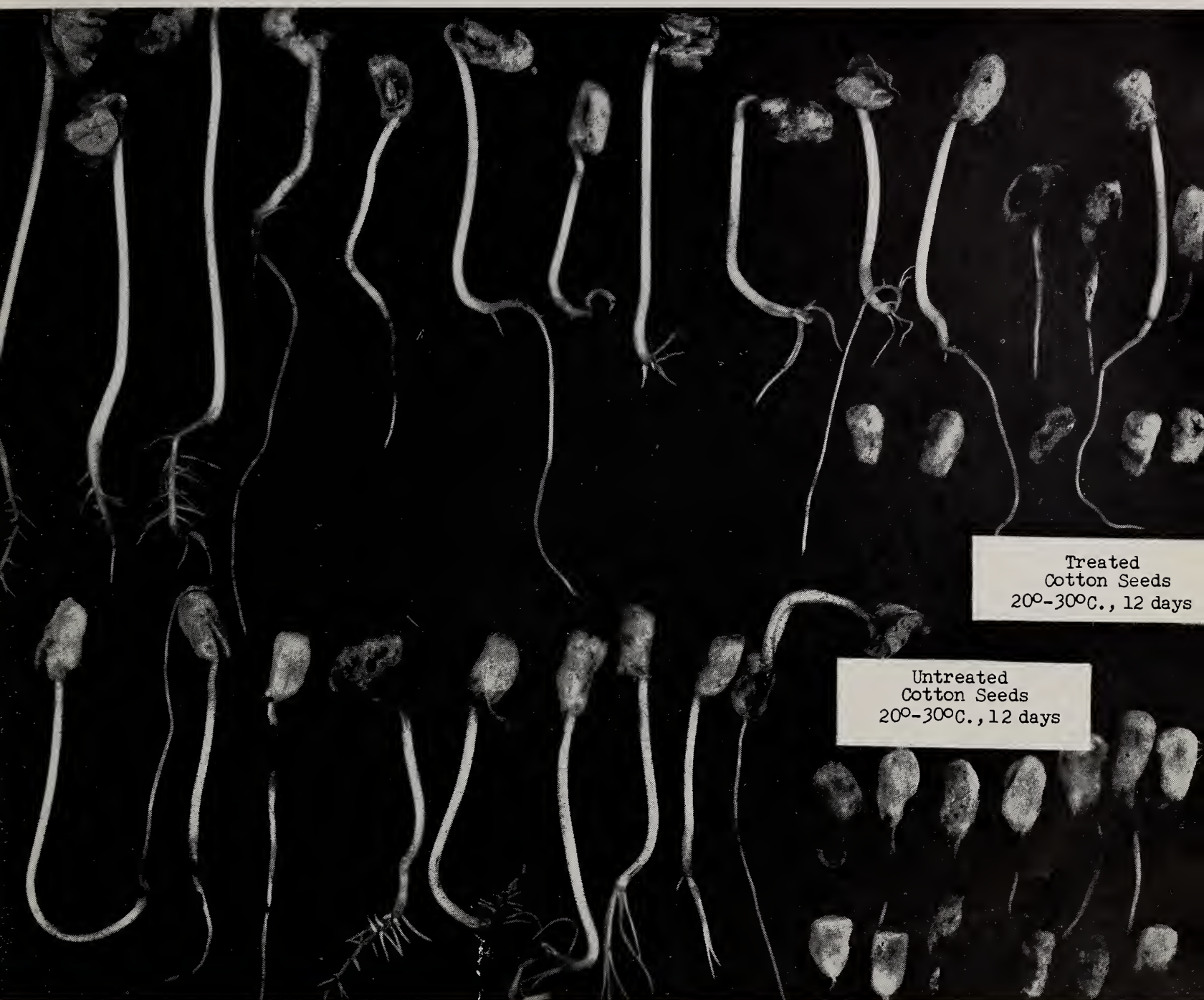
Another factor included in the tests was the presence of several kinds of

molds that cause most of the problems with damping-off, or death of seedlings. Researchers used seeds infected with six kinds of such molds. Good control over each kind of mold was obtained in the AMS tests.

Three common methods of incubation of the seeds were used in the tests. In two of the methods, the treated seeds were rolled in moistened towels placed in incubators, and held at either a constant 20° C., or alternating 20-30° C. In the third method the seeds were planted in flats and incubated in a greenhouse. Good results were obtained by the latter method, and also by the former method in which the temperature was alternated between 20° and 30° C.

Marketing researchers have suggested that the fungicide treatment be adopted in standard seed testing procedures. Both treated and untreated seeds would be tested and the results of the two tests reported together as dual germination percentage. The variable temperature (instead of an optional, constant temperature now used), and the 6-day testing period mentioned earlier were also recommended as a part of the official seed testing procedure.

The researchers also made other tests using, instead of a fungicide, chemical sterilants to kill the mold, and ultrasonic radiation, in which the fungi were literally shaken off the seeds by sound waves. Neither of these methods gave as good control over molds as did the fungicide. In some of the ultrasonic



A fungicide made the difference in germination between top and bottom rows of seedlings. Darkening of roots from fungal decay and failure of seeds to germinate or live after

germination are much less apparent on treated seeds. This is a representative sample used in test made by marketing researchers to improve germination test procedures.

tests, the sound waves merely increased the distribution of fungi among the seeds.

Electric conductivity tests were also made, to determine whether readings of electrical resistance could be used as a quick germination test. The salts and other cell constituents are soaked out or leached more readily from dead than from live seeds. A solution from seeds with a low germination conducts electricity more readily than that from

seeds with a high germination. This relationship held up, with some variations, in the AMS tests.

Further research is necessary before a fast electric resistance test can be recommended as a replacement for the longer, but more accurate, germination tests now in use. However, the use of electrical resistance tests, together with the approved tests, gives a better indication of the planting value than when tests are made without the electrical

resistance readings.

Complete details of the AMS tests are given in *Proceedings of the International Seed Testing Association*, January 1964.

When fungicides are used in practice, proper precautions should be observed to protect people, farm animals, and wildlife as noted on the label.

(The author was a seed botanist in the Market Quality Research Division before her retirement last year.)

When You Buy Seed This Spring . . .

Read the Label!

A GAIN this spring, homeowners are buying tons of seed for planting new lawns, or renovating old lawns. They're finding some mixtures to be rather expensive. In contrast they're finding others that sell at extremely low prices. Making a choice can be a bewildering process, particularly if you cannot recognize the differences between the high- and low-priced seed mixtures—and few homeowners can, without help.

The first concern of many people buying seeds is, "What does it cost?" But other considerations—such as kind and variety, purity, germination rate, and noxious-weed seeds present—are often more important and they're easy to check—by *reading the label*.

Truthful labeling is required under seed laws administered by each of the 50 States, as well as under a Federal law known as the *Federal Seed Act*, which applies to seed shipped across State lines.

It was passed by Congress 25 years ago to give truth-in-labeling protection to farmers and other consumers of lawn, agricultural, and vegetable seeds. It is administered by the U.S. Department of Agriculture through its Agricultural Marketing Service and enforced with cooperation from State seed agencies.

Here are some of the ways the Act helps the buyer of seed:

Kind of seed:

The buyer need not guess what the components of a mixture of seed are, since the Federal Seed Act requires that the label show the percentages of each kind of seed present.

Germination rate:

The germination rate, which also must be truthfully stated on the label indicates how much of the seed will come up when planted. If it has a germination of 85 percent, for instance, you can expect that about 85 of every 100 pure seeds will grow—if given the right care and growing conditions.

You should look to see when the seed was tested for germination, since seed naturally loses its viability as it becomes older, especially if it's in a warm, humid area. The date it was tested for germination must appear with other labeling information and must be no more than six months before it's shipped across a State line. State laws prevent the *sale* of seed with an old test—most allowing nine months.

These tests for germination and other quality characteristics are usually made by private or commercial seed laboratories, although some State seed laboratories also test samples for labeling purposes.

Purity:

Required labeling information also includes percentages of seeds and other materials that indicate purity. The percentage of pure seed is shown, as well as percentages of other "crop" seeds, weed seeds, and inert matter such as chaff, dirt, and stones.

Noxious-weed seeds:

Each State has a list of weed seeds which it has declared as "noxious." These are seeds of weeds that the State considers undesirable. The Federal Seed

Act requires that labeling for seeds shipped into the State show whether these weed seeds are present. If they are, the number cannot exceed the permissible limits set by the State.

Origin:

Other labeling required on certain agricultural seeds includes the origin of the seed. The name and address of the shipper or labeler is required on all seeds offered for sale. The average homeowner may not be interested in this information, but farmers buying crop seeds are. And for their protection—in case they later find the seed was misrepresented—farmers often keep a sample of the seed they're sowing.

Mislabeling and false advertising by seed firms is the exception rather than the rule, but seed law enforcement officials of AMS and the States are constantly on the lookout for such practices. To determine whether seed is correctly labeled, State seed inspectors routinely draw samples for testing by State and Federal seed laboratories.

When you buy vegetable seeds, look for label information that's somewhat different than for lawn and agricultural seeds. Labeling required for vegetable seeds includes the name and address of the shipper. Vegetable seeds, too, must meet specified germination standards to be shipped across State lines.

For instance, tomato seeds must have a germination rate of 75 percent and carrot seeds, 55 percent. If they're below these established standards, the words, "Below Standard," must appear on the label.

Now's the time when homeowners have greatest opportunity to take advantage of the truth-in-labeling protection offered by the Federal Seed Act and State seed laws. Before buying, it's well worth the time it takes to read and compare specific labeling information on containers of seed that are priced at different levels.

You may discover that the "bargain buy" in seeds is not necessarily the bargain that its price tag suggests!